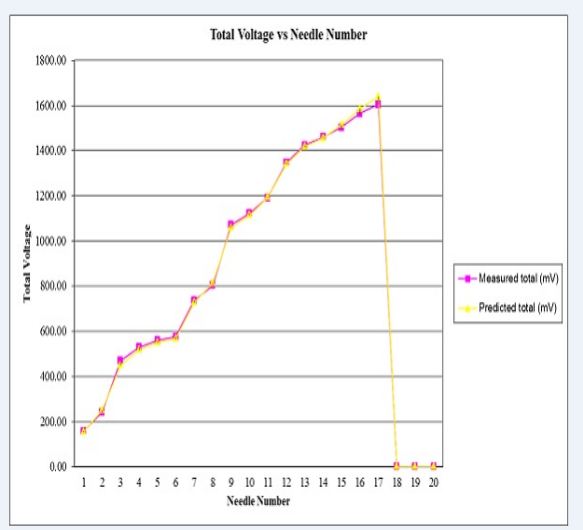
dependence within the uncertainty of the measurements; hence no azimuthal and polar correction factors were applied to the measurements. No temperature dependence was found within the uncertainty of the measurement. The measured patient plans were in good agreement with the predicted voltage of the dosimeter with the minimum and maximum percentage differences between the measured and the predicted of -2.6% and -11.3% respectively. Further investigation of the causes of these differences and of per needle dose measurements to allow real-time error detection is still ongoing. Total uncertainty budget of this study was 9.97% for k=2. An example of a clinical patient result is given in the figure.



Conclusions: Our study has demonstrated that implementation of real-time in-vivo dosimetry for HDR prostate brachytherapy using a MOSFET is feasible. Gross error detection is possible when the MOSFET is placed in a low dose gradient and appropriate correction factors are applied.

OC-0175

In vivo rectal dose measures compared to planned and reconstructed doses in US-based HDR prostate brachytherapy

M. Carrara[1], C. Tenconi[1], D. Cutajar[2], M. Borroni[1], S. Grisotto[1], A. Cerrotta[3], B. Pappalardi[3], C. Fallai[3], M. Petasecca[2], J. Bucci[4], M. Lerch[2], G. Gambarini[5], A. Rosenfeld[2], E. Pignoli[1]

[1]*Fondazione IRCCS Istituto Nazionale dei Tumori, Medical Physics Unit, Milan, Italy*

[2]*University of Wollongong, Centre for Medical Radiation Physics, Wollongong, Australia*

[3]*Fondazione IRCCS Istituto Nazionale dei Tumori, Radiation Therapy Unit 2, Milan, Italy*

[4]*St George Cancer Care Centre, Radiation Oncology, Kogarah, Australia*

[5]*Università degli Studi di Milano, Department of Physics, Milan, Italy*

Purpose/Objective: To study if real time *in vivo* dosimetry, performed on the rectal surface with MOS*kin* detectors included on the trans rectal ultrasound (TRUS) probe, may evaluate possible discrepancies between calculated and delivered doses during US-based HDR prostate brachytherapy.

Materials and Methods: MOS*kins* are a specific type of MOSFET dosimeter, optimized to measure dose in steep dose gradients. Their sensitive volume, defined by the volume of the gate oxide, is 4.8 x 10^{-6} mm^3. In this study, two MOS*kin* dosimeters were calibrated and assembled on the surface of a TRUS-probe, used for real time on-line treatment planning in HDR prostate brachytherapy. During the treatment, the TRUS-probe was left inside the rectum and real time measures of the delivered dose were performed over 14 treatment sessions (prescribed dose to the target surface: 14Gy).

Measured doses were compared to the doses calculated by means of the treatment planning system in the estimated detector position both on pre-treatment images (*i.e.*, acquired 1-2 hours before treatment and used for treatment planning) and on post-treatment images (*i.e.*, acquired within 3 minutes after treatment). In the latter case, the delivered dose distribution was retrospectively reconstructed and assumed as the reference.

Results: Comparison between planned, reconstructed and *in vivo* measured doses, in terms of average absolute differences and maximum discrepancies, are given in the following table.

	Average absolute dose difference <|ΔD|>	Maximum absolute discrepancy
Planned vs reconstructed dose	5.1% ± 2.9%	14.2%
MOS*kin* vs planned dose	6.7% ± 4.9%	18.2%
MOS*kin* vs reconstructed dose	3.8% ± 2.1%	7.8%

Data reported in the table shows that the highest accordance resulted between MOS*kin* readings and doses obtained on reconstructed plans, suggesting that in particular cases in vivo dosimetry might be a better instrument to estimate the dose to the rectum rather than the original treatment planning system itself.

Comparing pre- and post-treatment images, it can be demonstrated that the high observed discrepancy between treatment and reconstructed plans is mainly due to anatomical variations of the prostate shape (*i.e.*, prostate swelling with expanding inter-needles distances) and position (*i.e.*, shift towards the rectal wall). This discrepancy correlated with the treatment planning time.

Conclusions: Doses delivered to the organs at risk during HDR prostate brachytherapy might differ significantly from what is calculated in the treatment planning phase, providing the need for *in vivo* dosimetry in this particular radiotherapy application. MOS*kin* dosimeters integrated to the TRUS-probe proved to be an accurate instrument to perform real time measurement of the dose delivered to the rectal wall. The use of the dosimeters was incorporated in our department into clinical practice, actions protocol are still under study to potentially use the information acquired on-line.

OC-0176

Urethral in vivo dosimetry in HDR prostate brachytherapy with Ir-192 and Co-60 sources

D.R.L. Rodriguez Latorre[1], J.F. José Fernández[1], G.F.R. Gema F. Rivero[2], D.C. Diego Crelgo[1], J.M.G. José Manuel González[1], P.S. Pedro Sánchez[1], A.V. Alfonso Villacé[1], E.S. Elena Sánchez[1], M.A.A. María Ángeles Arroyo[1], E.G. Ester García[2], E.T. Ester Trabanco[2]

[1]*Hospital Universitario Central de Asturias, Radiofísica, Oviedo, Spain*

[2]*Hospital Universitario Central de Asturias, Oncología Radioterápica, Oviedo, Spain*